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SCIENCE NEWS LETTER

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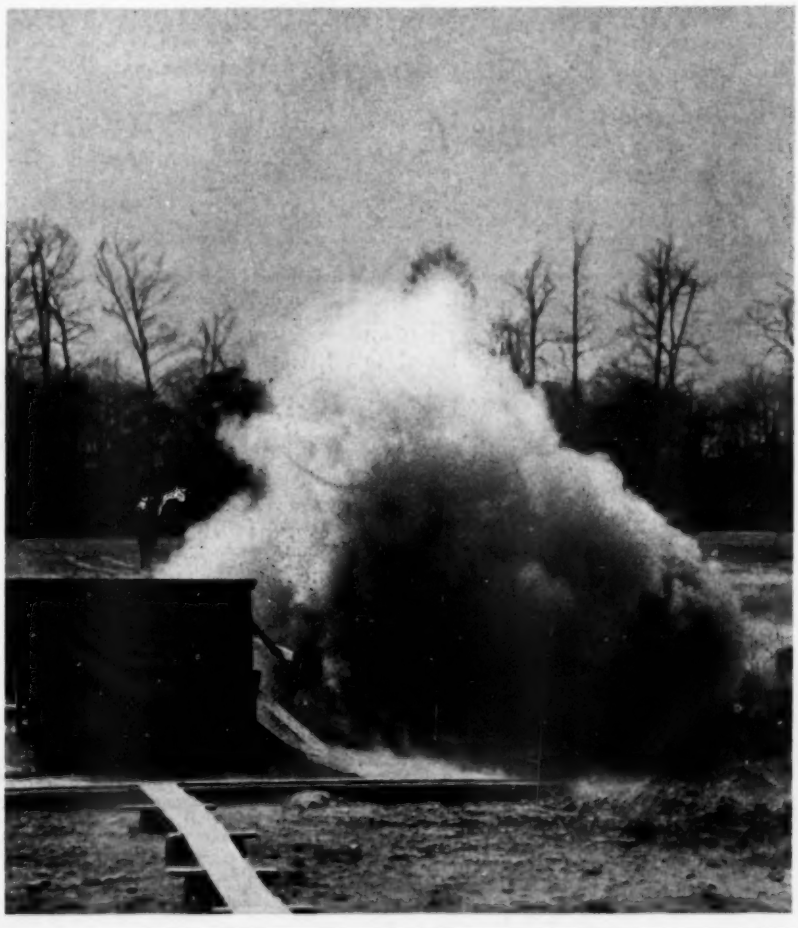
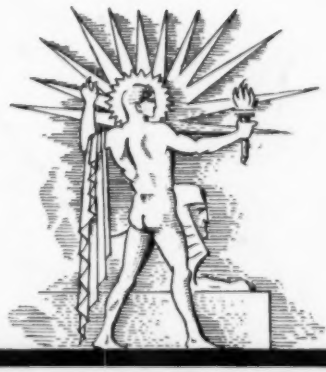
THE WEEKLY SUMMARY OF CURRENT SCIENCE •





April 6, 1940

Demonstration

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A SCIENCE SERVICE PUBLICATION

Do You Know?

The *Beardmore Glacier* in the Antarctic, believed the world's largest glacier, is about 100 miles long and 15 miles wide.

The normal eye's *blind spots* are points in the retina of the eye where the optic nerve leaves the eyeball and leads toward the brain.

Ultraviolet irradiation of *dough* during mixing improves the color and fermentation of baked bread, British experiments indicate.

Flat white *paint* reflects back 75% to 85% of the light thrown on it; a light blue reflects 40% to 55%; and dark brown 10% or less.

Roughening concrete *road surface* by applying hydrochloric acid, to reduce skidding risks, has been tried experimentally in England.

Using airplanes, the National Park Service in Alaska can *patrol* territory in three and one-half hours which would require four weeks' work by dog-sled.

The Berkeley, Calif., police department employs 12 *Doberman Pinscher* dogs, especially valuable because they can be trained to face gun fire and to disarm the person using the firearm.

The *Elgin marbles,* sculptures from the Greek Parthenon which were bought by the British government in 1816, have recently been cleaned, thereby arousing controversy over best way of handling such precious art relics.

Effects of *air conditioning* on human beings in the tropics will be tested in Singapore.

Some of Germany's airplanes used in long-distance flights are equipped with *Diesel* engines.

Channel Islands off California are peaks of mountain masses that long ago were submerged.

The South *Magnetic Pole* has shifted westward since 1909, the Byrd Antarctic Expedition has tentatively reported.

A *deer* fights with its feet, not its antlers.

Skim-milk, sufficiently chilled, may be whipped stiff—but it does not remain stiff very long.

Generally speaking, *Old Testament* books were written first in Hebrew, and the *New Testament* books in Greek.

The *orchard oriole,* when nest-building, chooses grasses that are nearly the same length, thereby making the nest pliable and strong.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

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SCIENCE NEWS LETTER

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PHYSICS

New Apparatus May Double World's Record High Pressure

"Cascade Bomb" Apparatus May Eventually Produce Pressure Equal to That Inside Earth 745 Miles Deep

SCIENTISTS stand at the threshold of experiments which should enable them to duplicate pressures encountered 745 miles down inside the earth, and double present world's record pressures of 3,000,000 pounds to the square inch and over.

The record high pressure, equaling pressures more than 100 miles within the earth, has just been obtained by two scientists of the Carnegie Institution of Washington, Dr. Roy W. Goranson of the Geophysical Laboratory and Ellis Johnson of the Department of Terrestrial Magnetism with a "cascade bomb" apparatus. Their results virtually duplicate the high pressure of 3,000,000-3,500,000 pounds per square inch reported (*Physical Review*, Feb. 15) by Prof. P. W. Bridgman of Harvard University. (*See SNL*, March 9.)

Limited By Gauge

The only reason the Carnegie experiment was stopped at 3,000,000 pounds per square inch, or 200,000 atmospheres, was that the pressure gauge used was not calibrated beyond that point. The pressure equipment itself potentially may be capable of doubling this pressure. If this can be done, it will produce a pressure equal to that inside the earth at depths of 745 miles and permit important studies of the properties of matter at these pressures.

Announcement of the Carnegie's new cascade bomb equipment was a dramatic highlight of the Conference on Theoretical Physics which is sponsored annually by the Carnegie Institution and George Washington University. The theory which led to the construction of the apparatus will be presented in *Journal of Chemical Physics* (April). The distinguished scientists present heartily applauded the new high-pressure achievement which was performed in an intensive all-night research by Dr. Goranson and Mr. Johnson.

It was at this same conference, just a year ago, that the dramatic announcement was made to America that science had found a way to split uranium atoms with neutrons and make them yield enormous amounts of atomic energy.

Secret of the amazing pressures attained by the Carnegie experimenters is the use of cascade bomb apparatus. This device consists of two pressure chambers arranged one inside the other so that the inner one is surrounded with a kerosene-like oil known as varsol under a pressure of 17,000 atmospheres, or 255,000 pounds to the square inch.

Under this low pressure (low only by comparison) the steel walls of the small, inner pressure chamber are tightly squeezed on all sides and the steel of the chamber appears to take on greatly increased strength. This extra strength permits a tiny plunger inside the inner chamber to be forced inward with a total pressure of 3,000,000 pounds to the square inch.

Under ordinary conditions the steel chambers would probably not be able to withstand pressures of much more than 600,000 pounds per square inch.

It is inside the inner pressure chamber that the sample is placed which is subjected to the 3,000,000 pounds pressure.

Table Salt Used

Dr. Goranson and Mr. Johnson, in their tests, used ordinary table salt, sodium chloride. They found that at the extreme pressure it was squeezed so tightly its volume was decreased by 20%, or one-fifth. This means, it is explained, "that the space inside the sodium chloride molecule was mostly eliminated by the pressure, so that the atoms making up the molecules of salt actually, or nearly, touched one another."

Contrary to some other chemical substances which have been studied under high pressures previously, the salt used in the Carnegie tests appears to have suffered no color or structural change.

The new apparatus will greatly extend the pressure ranges over which scientists can study the behavior of many materials.

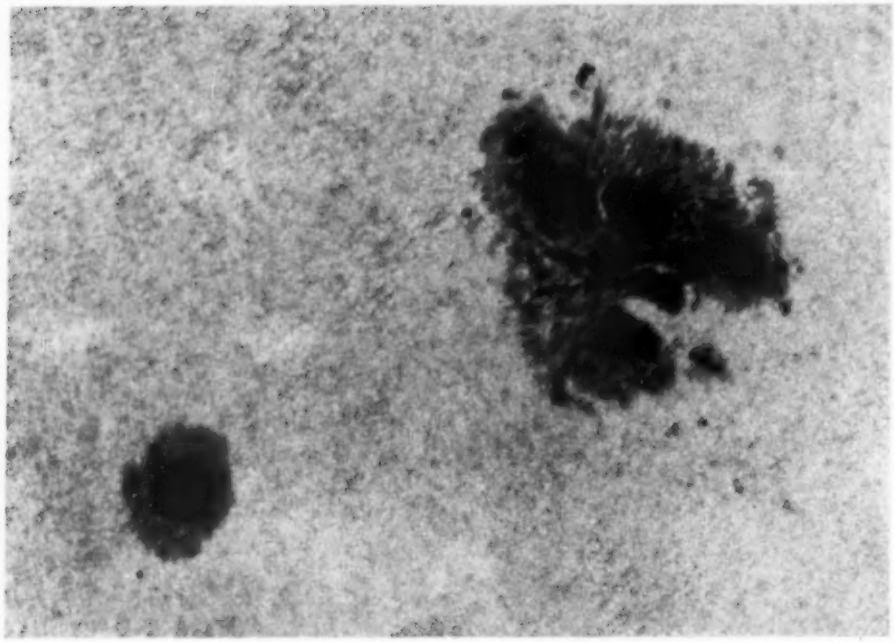
It is already known in chemistry that the speed of some reactions can be increased by pressure. Pressures up to 1,000 atmospheres—15,000 pounds per square inch—are used in chemical syntheses.

It would be theoretically possible, although quite costly, to extend the ability of the cascade bomb by housing the two pressure chambers within still another chamber. The ultimate pressure which could be created in this way would be limited, Dr. Goranson said, only by the pressures at which the steel walls of the innermost chamber would finally reach a state of plastic flow. While the scientists cannot guess this pressure, it is known to be extremely great.

It is possible that with extreme pressures scientists will be able to bring about changes in matter which are believed to have occurred deep within the earth at the tremendous pressures there encountered. At the center of the earth, it is estimated, the pressure is 3,500,000 atmospheres or over 52,000,000 pounds per square inch. Even with 3,000,000 or 6,000,000 pounds per square inch pressures, science will be a long way from this figure, but every increase adds knowledge about one of science's major mysteries — the internal constitution of the earth.

FOR RECORD PRESSURES

Dr. Roy W. Goranson (left) examining the apparatus he designed with Ellis Johnson at the Carnegie Institution's Department of Terrestrial Magnetism for producing the world's highest pressure. L. H. Adams, director of the Geophysical Laboratory stands at the right.



EASTER SUNDAY DISTURBANCE

The magnetic storm of Easter Sunday, March 24, was blamed by scientists on this giant sunspot cluster. This photograph was taken at the Mount Wilson Observatory of the Carnegie Institution of Washington at 7 a.m. on that date. The earth is just about the size of the dark center in the nearly round nearby spot.

METALLURGY

New Alloy Strong as Steel And Noiseless as Rubber

Developed in Bureau of Mines Manganese Experiments, It Opens New Possibilities Such as Noiseless Gears

AN ALLOY as strong as steel, but as noiseless and as free from "chatter" as rubber, is only one of a series of new metals being evolved in the manganese experiments of the U. S. Bureau of Mines, according to Dr. R. S. Dean, chief engineer of the metallurgical division of the Bureau.

In a demonstration before the Colorado Mining Association in Denver, Dr. Dean dropped a piece of brass and a piece of steel on the floor with a clang. Then he dropped a piece of the new alloy. There was a slight thump but no ring or clang whatever—much the same as if a piece of hard rubber had been dropped.

The new alloy is of manganese and copper properly heat-treated, Dr. Dean said.

"It dampens or absorbs vibrations like rubber or good cardboard, which convert noise into heat," he indicated.

"The silent properties of rubber are sought after, but there are many places in industry where it cannot be used. Generally speaking, rubber substances are unusable in tension—rubber axles or drive shafts are hardly feasible.

"Here we have an alloy with the strength and modulus of elasticity of mild steel, that has the noise-absorbing properties of rubber. This opens up many new possibilities; chatterless spring suspensions, noiseless gears, a muffler for a whole host of bothersome industrial sounds. This alloy is being tried for those uses now."

The new manganese-copper alloys are made possible by the reduction of manganese by electrolysis, which permits metal 99.96 per cent. pure to be made, as against 96 or 97 per cent. purity by older methods. The less pure manganese is used mostly for alloying with iron.

An alloy of the new purer manganese, with 2 per cent. copper and 1 per cent. of nickel, resembles copper in ductility and other qualities, but by heat treatment it can be given an electrical resistance 1,000 times that of copper.

Another manganese-copper-nickel alloy has a tremendous hardening range, from that of copper to that of die steel, Dr. Dean said. This hardening can be so controlled that the interior of a tool or casting can be as soft as copper while the surface is hardened like that of steel.

Still another property of some of the new manganese alloys is low heat conductivity. This opens vistas of pot-handles and holders made of metal but which stay as cool as wooden handles.

The new purer manganese can be added to aluminum in amounts up to 8 per cent., hardening the metal. Older, less pure manganese made aluminum brittle when more than one and one-half per cent. was added, Dr. Dean said.

Pure electrolytic manganese still has a relatively high cost, around 50 cents a pound, but quantity production will bring that cost down and render manganese a formidable ally of the non-ferrous metals in competing with steel and its alloys.

Manganese ore of suitable grade for use in the steel industry has been classed as a deficiency, strategic mineral by the government. The Bureau of Mines and the Geological Survey are engaged in finding domestic sources of high grade ore.

The electrolytic process, Dr. Dean said, while not an immediate solution of this problem, uses low grade ore that is plentiful in this country. When the experimental process is fully developed it would provide an emergency domestic source of manganese suitable for the steel industry.

Science News Letter, April 6, 1940

ANTHROPOLOGY

Story of "Baboon Boy" Confirmed by Evidence

EVIDENCE of the authenticity of the case of the "Baboon Boy," of South Africa, who was believed stolen from his native mother as an infant and nurtured by wild baboons, has been collected by the well known anthropologist, Dr. Raymond A. Dart, of the University of Witwatersrand, Johannesburg, South

Africa, and has just been made available to other scientists.

Although many cases of "wild children," little Mowglis reported brought up by wild beasts of the jungle, have gained prominence from time to time, this "appears to be the first case of a human child adopted and reared by infra-human primates," Dr. John P. Foley, Jr., of the George Washington University, said in reporting his correspondence with Dr. Dart to the scientific journal, *Science*. (March 22.)

Dr. Dart investigated the case by writing to the mental hospital where the child was said to have been taken when "trapped" about 1903 and to the police headquarters for information of his discovery. Although the mental hospital was unable to find any records because it is not known under what name he was admitted there, the police were able to locate a Constable W. J. Coetzer, who had heard the story of the boy's discovery from ex-Lance Sergeant C. Holsen, now dead, who was a member of the patrol who found him.

The "Baboon Boy" is now a man of 49. On the farm of George W. Smith, he developed into a dependable worker "remarkably intelligent," learned to speak English, and was able to relate details of his past life among the baboons. However, he "took no account of time, or even of dawn or evening." He had apparently lived with the baboons from infancy until he was about 12 or 14 years old.

Science News Letter, April 6, 1940

GENERAL SCIENCE

Scientists of All Americas To Meet in Washington

Eighth American Scientific Congress Will Celebrate Fiftieth Anniversary of Pan American Union

PLANES para la mobilización de todas las fuerzas científicas de las Américas para atacar, en concierto, al principal enemigo del hombre, la ignorancia, siguen tomando forma en Washington.

GRADUALMENTE vão tomando forma os planos que se preparam em Washington para a mobilização de todos os elementos científicos das nações americanas, para entrar em luta combinada contra o principal inimigo do homem—a ignorância.

PLANS for a mobilization of all the scientific power of the Americas in a concerted battle against man's chief foe, ignorance, are taking shape in Washington.

The Eighth American Scientific Congress will bring together in Washington on May 10 delegates and participants from all the American Republics, members of the Pan American Union, where they will take part in celebrating the fiftieth anniversary of the founding of the Union and participate in an exchange of knowledge in eleven scientific sections.

The sections of the Congress are: *Anthropological Sciences,* presided over by Dr. Herbert J. Spinden, curator of American Indian Art and Primitive Cultures, Brooklyn Museum. The problems to be discussed in this section are mainly those of international interest and include those in the field of psychology.

Biological Sciences, with Dr. Edwin G. Conklin, professor emeritus of Princeton University, as chairman. Biology, physiology, botany, zoology and economic botany and zoology are included in this section.

Geological Sciences, under the chairmanship of Dr. T. Wayland Vaughan, president of the Geological Society of America. Geology of metal and mineral resources, including oil fields, and the volcanology of Central and South America will be among the important matters discussed in this section.

Agriculture and Conservation, Dr. Hugh H. Bennett, chief of the Soil Conservation Service, U. S. Department of Agriculture, Chairman. In this field, the Americas have much in common.

Public Health and Medicine, Dr. Thomas Parran, surgeon-general of the United States Public Health Service, Chairman. Seven subjects of a very practical nature have been agreed upon for discussion, including: Nutrition, Tuberculosis, Cancer, Chemotherapy, Heart Diseases, Rehabilitation of Physically Handicapped Children, and Tropical and Other Diseases.

Physical and Chemical Sciences, Dr. Lyman J. Briggs, director of the National Bureau of Standards, Chairman. Of common interest to all participants are researches in location and utilization of petroleum, transportation of fruits and meats, testing and purification of sugar, and determination of quality of textiles.

Statistics, Dr. Stuart A. Rice, chairman of the Central Statistical Board, Chairman. Trade statistics, industrial statistics, vital statistics, and development of a continuing professional medium for interchange of ideas and information are among the topics for this section.

History and Geography, Dr. Clarence H. Haring, professor of Latin American History and Economics at Harvard University, Chairman.

International Law, Public Law, and Jurisprudence, Dr. James Brown Scott, secretary, Carnegie Endowment for International Peace, Chairman.

Economics and Sociology, Dr. Harold G. Moulton, president of the Brookings Institution, Chairman.

Education, Dr. Nicholas Murray Butler, president of Columbia University, Chairman.

At a time when many of the major countries of the world are devoting all their energies to armed conflict and war activities, this meeting of American scientists and scholars is dedicated to promoting friendly relations, better understanding and close collaboration for the conquering of the common foes of all mankind.

Science News Letter, April 6, 1940

MEDICINE

Inflamed Pancreas Likely For Habitual Drunkards

THE AFTERMATH of a prolonged bout of heavy drinking is likely to be an inflammation of the pancreas which may result in death, Dr. Eugene Clark, assistant medical examiner, New York City, warned at the meeting of the American Association of Pathologists and Bacteriologists in Pittsburgh.

The disease is more likely to occur in habitual drunkards than in those who occasionally become intoxicated, Dr. Clark found. It bears "as striking a relationship to long continued heavy alcoholic indulgence as does cirrhosis of the liver," he said.

He reported details of the condition of the pancreas at death in 44 cases of acute and chronic alcoholism examined at autopsy in the laboratories of Bellevue

Hospital and the office of the Chief Medical Examiner, New York City. In 19 of these the pancreas condition was so severe as to be held responsible for the deaths. A history of long continued heavy indulgence in alcohol was obtained in 11 of these and in at least nine cases the onset of the pancreas disease was preceded by an alcoholic bout. The frequency with which inflammation of the pancreas and alcoholism are associated is indicated from the fact that 27 of the reported cases were found in about 150 consecutively autopsied cases of acute and chronic alcoholism dying in Bellevue Hospital.

The pancreas condition is not significantly associated with cirrhosis of the liver, Dr. Clark said. Cirrhosis of the liver was absent as often as it was present in the cases of the pancreas disease.

Science News Letter, April 6, 1940

Chemical Hardens Arteries

HARDENING of the arteries is due fundamentally and directly to undernourishment of the walls of the arteries, in the opinion of Dr. W. C. Hueper, New York City. Support for his theory appeared in experiments in which he treated rats with the chemical, erythrol tetranitrate. This substance lowers both blood pressure and the amount of oxygen in the blood. As a result, nourishment of the arteries might be impaired. In the experiments Dr. Hueper reported to the Pathologists' meeting, the rats after treatment with this substance developed sclerotic or hardened arteries of the heart, lung, kidneys and certain other organs.

Science News Letter, April 6, 1940

TECHNOLOGY

Novel Use of Paint In Industry's Building

VERMILION ceilings with center medallion done in white, walls caenstone color. This is how national headquarters for the paint, varnish and lacquer industries have decorated the entrance into their new offices in what was once the home of Vice-President Levi P. Morton. Other uses of color chosen for light reflection value as well as beauty: soft light blue on the walls of the stenographic room, walls of old burgandy in a room with a beautiful carved white Carrara marble fire place, laboratories in tints of pale green, yellow and gray, three shades of blue in another office, cafe au lait and muskmelon tint for still another office, and fireplace mantel in the library, vermilion, antiqued with black.

Science News Letter, April 6, 1940

DAMAGE

Half buried in a sand-bag pit a five-pound Barlow bomb produced enough concussion to knock the side off a nearby shed. In the illustration on the front cover of this week's "Science News Letter," the boards can be seen in the air as they leave the shed. The compression wave of this blast was strongly felt by observers behind distant sand-bag barricades. Photos on cover and this and facing pages by Fremont Davis, Science Service staff photographer.

MILITARY SCIENCE

Barlow Demonstrates Safety Of Oxygen-Carbon Bomb

But Experts Point to Long History of Such Explosives In War and Mining To Justify Their Strong Skepticism

See Front Cover

INVENTOR Lester P. Barlow and his colleague, G. B. Holderer, explosives consultant, did everything but jump on his liquid oxygen-carbon explosive bombs to prove their safety from shock, at the proving ground of the Glenn L. Martin airplane plant at Middle River, Md. They burned the bombs, fired rifle bullets into them, shot them out of a trench mortar 500 feet into the air, shot them against a steel plate so that they ricocheted 300 feet—all without explosions.

After each "safety" test they took the battered bomb and exploded it with startling effectiveness by blasting caps.

But unanswered riddles after a five-hour-long demonstration included the Barlow bomb's effectiveness compared with TNT and whether it could be applied to military purposes. In fairness to the inventor it must be said that in his recent demonstration he sought only to prove the safety of his explosive to shock.

Claim of Mr. Bar- (*Turn to page 222*)

THE Senate Military Affairs Committee may have burned the recent, secret testimony of Lester P. Barlow about his liquid oxygen-carbon bomb but it is likely that at least 99% of the facts about the explosive are contained in technical libraries and have been known for years.

There is more than a suspicion that Mr. Barlow's "glmite" explosive is just L.O.X. rechristened. L.O.X. stands for liquid oxygen explosive which is a term coined back in the 1920's by one of the nation's foremost authorities on the explosive properties of liquid oxygen and carbon: Dr. G. S. Rice, former chief mining engineer of the U. S. Bureau of Mines who retired in 1937.

From recent publicity one might think that Barlow's use of liquid oxygen adsorbed by powdered carbon was the newest of the new when, as a matter of fact, liquid oxygen explosives were among the reasons which made the German high command confidently prepared to begin the World War, as it could be substituted for nitrated explosives formerly obtained by importation from Chile.

Prime German World War weapon was the discovery of the Haber process to take nitrogen out of the air and make military explosives out of it. L.O.X. came into the picture because it gave Germany a secondary explosive to use in its mines, thus freeing nitrated explosives for military purposes.

Dr. Rice, after the armistice, went to Europe to assist the Peace Commission and report on the military destruction of the north of France and to investigate Germany's use of L.O.X. to destroy French coal mines and industrial plants.

In the evacuated areas Dr. Rice found 136 L.O.X. plants which, during the war, made 5,346,000 pounds of liquid oxygen explosive; the equivalent of 8,000,000 pounds of dynamite containing 40% nitroglycerine. One feature of the German World War practice was the use of little portable liquid oxygen plants producing from 3 to 5 liters per hour.

Unless an impartial test by some government agency proves that Mr. Barlow and his associate, G. B. Holderer, have circumvented the chemical laws governing the release of energy by an explosive it appears improbable that the new Barlow glmite (named after the Glenn L. Martin Co.) is much more than a refinement of L.O.X. which has been used on a wide scale in mining for 20 years.

The scientific literature of L.O.X. is very voluminous. A day spent in the library of the U. S. Bureau of Mines will show hundreds of pages describing experiments which the Bureau itself has carried out to help make L.O.X. the respected explosive it is today in the mining field.

GLMITE

Looking like a frosted sausage is this little half-pound Barlow bomb of liquid oxygen and carbon. The bombs are handled with pliers because of their extreme low temperature.

Thousands of pounds of L.O.X. are used annually in the strip coal mines of Illinois and Indiana where the seams of coal are only 10 to 60 feet beneath the surface of the earth. The seam is exposed by power shovels after explosives have loosened the overlying ground. At these strip coal mines central plants produce liquid oxygen on a large scale and the companies use L.O.X. every day with low cost, good efficiency and with an accident record no worse than that for dynamite and other, more familiar, explosives.

Down in South America at the copper mines of the Chilean Exploration Co., L.O.X. is used successfully in deep mines. The company has turned to L.O.X. because it feared the hazard of handling the vast amounts of explosives it required which formerly were shipped in by the boat load and transported to the mines by whole train loads. As a minor note, too, they experienced theft of dynamite for this explosive served as a makeshift form of money. They saw in L.O.X. a way to obtain an "unnegotiable" explosive and at the same time decrease storage hazards.

Only in open mines, reports of U. S. Bureau of Mines experiments show, is L.O.X. a useful, safe explosive. It has been found that in closed workings it may generate deadly carbon monoxide and is a hazard.

Moreover, there is the possibility in underground coal mines that the liquid oxygen will be spilled on nearby coal dust and generate more L.O.X. These, and other reasons, make the U. S. Bureau of Mines frown on the use of L.O.X. in underground mines. What is done in South America is no concern of the Bureau. The open strip coal mines of the middle west can use L.O.X. without any more risk than in using dynamite.

Here are the advantages and disadvantages of L.O.X. as used commercially, as taken from the authoritative Bulletin 349 of the U. S. Bureau of Mines, published in 1932.

Advantages of L.O.X.

1. No storage hazard because L.O.X. is not suitable for indefinite storage owing to its purely temporary explosive nature.

2. No danger in transport of the separate ingredients; liquid oxygen and carbon.

3. No danger of misfires for if the liquid oxygen is allowed to evaporate, as it quickly does, there is no explosion. This means that there are no unexploded cartridges in the mine.

4. Excellent value in cold climates. L.O.X. has a temperature of 183 degrees below zero Centigrade, so that even Alaska's coldest winters are warm by comparison. In contrast, dynamite sometimes requires thawing by heat for when frozen it is very unstable and liable to accidental explosion by shock.

Disadvantages of L.O.X.

1. Somewhat more sensitive to shock and impact, but no more than certain dynamites.

2. Inflammable nature. Because L.O.X. liberates pure oxygen constantly by evaporation it can turn a nearby glowing coal into a burst of flames.

3. The rapid evaporation of L.O.X. sometimes leads to speedy handling of the explosive; hence carelessness that may lead to disaster.

4. Generation of deadly carbon monoxide in underground operations.

5. Liquid oxygen spilled on coal dust in preparing the L.O.X. cartridges may create more unintentional L.O.X. in the mine.

Science News Letter, April 6, 1940

MEDICINE

Heart Disease Reported From Lack of Vitamin B

DISEASE of the heart muscle and death resulting from a lack of vitamin B and potassium in the diet was reported by Drs. R. M. Thomas, E. Mylon and M. C. Winternitz, Yale University School of Medicine, at the meeting of the American Association of Pathologists and Bacteriologists in Pittsburgh.

Young pigs and rats were the victims in the diet studies reported. Only the heart was damaged by the experimental diet, and the damage depended on the combination of potassium deficiency and vitamin B deficiency. When the animals got an adequate amount of either the potassium or the vitamin, heart damage was prevented. The particular part of the vitamin B complex involved is B_6, the Yale investigators found from experiments with diets lacking in various parts of this vitamin as well as in potassium.

Science News Letter, April 6, 1940

An electric fence will be tried out as a device for keeping *elephants* from getting into rubber plantations, in India.

MEDICINE

High Blood Pressure Linked with Heredity

HEREDITY and high blood pressure are linked by figures, just released, from Mayo Clinic case histories of patients returning to the Clinic after 10 or 20 years.

At their first visit these patients had normal blood pressures. Parents of some of the patients had high blood pressure and parents of others did not, the Clinic physicians learned.

Of the 1,374 patients in the study, reports Dr. E. A. Hines, Jr., 58 stated at the time of the original examination that both parents had high blood pressure. Of these, 52 or 89.6%, had high blood pressure 10 or 20 years later.

On a percentage basis, the occurrence of high blood pressure was about six times greater among the group with a history of high blood pressure in the family than among the group with a history of no high blood pressure in the family.

The figures in this study bear out figures from a previous study of predisposition to high blood pressure by ice water tests made by Dr. Hines. The test consists in measuring the rise in blood pressure produced by the stimulus of placing one hand in ice water. A family history of high blood pressure was found five times as often among persons who reacted abnormally to the ice water test, indicating they had high blood pressure or a tendency to it, as among the normal reactors.

Science News Letter, April 6, 1940

ENTOMOLOGY

Fly Eats Spider In Reversal of Usual Roles

WHEN a fly eats a spider, that ought to be news.

Such a strange reversal of the traditional roles of eater-and-eaten is described by George Elwood Jenks. (*Natural History,* March) And to make the reversal even more complete and strange the fly does its eating from the inside and makes a very leisurely job of it, taking a year to turn its eight-legged victim into an empty shell.

The eater is a brilliantly black-and-yellow fly known to scientists as *Ocnaea smithi*. The eaten is the trapdoor spider, which lives in a silk-lined tunnel with a lid so tight that it is well-nigh impossible to open it even by force when the spider is at home.

The female fly lays her eggs on the wing, dropping them around the trapdoor spider's nest like miniature airplane bombs over a beleaguered city.

Most of the tiny grubs or larvae that hatch from the eggs perish, but one or two may find a spider burrow and literally worm their way in. The larva then gnaws its way through the spider's skin, and for a year feeds within its victim's body, slowly hollowing it out while it grows fatter and fatter itself.

At last the immensely-grown grub emerges, attaches itself to the silken lining of the burrow, and goes through the transformations that eventuate in the adult, winged insect. Then, after a year of underground, boring-from-within existence, the fly emerges into upper air, and sunlight, to mate and breed and repeat the cycle.

Having no feeding mouthparts, adult life of the insect is short. A year in the dark, a week in the daylight world, and it is all over.

Science News Letter, April 6, 1940

PHYSIOLOGY-AERONAUTICS

Propose Putting Pilot On Back or Stomach

NOVEL position for airplane pilots, seriously suggested in Germany: on back or stomach, not sitting up conventionally. Reason: The circulation in this position can endure great speed acceleration without strain. However, the Berlin correspondent of the *Journal of the American Medical Association* admits the technical difficulties of placing the pilot in a dorsal or ventral position are immense.

The effect of speed acceleration on airplane pilots is a worrisome problem in military aviation. The least indisposition of the pilot, it is said in medical aviation circles, lasting less than a second, is sufficient to produce a catastrophe. Even under the best conditions, a normal reaction time of a fifth of a second means that an airplane traveling 360 miles an hour covers a distance of 120 feet or so unsteered before the pilot is again able to maneuver.

Not speed, but centrifugal force, causes critical changes in hydrostatic pressure in the pilot's vascular system.

Advice to pilots: Don't undertake strenuous flights without breakfast. Flying on an empty stomach or only a cup of tea or a cigarette means decided loss of power of resistance in endurance of speed acceleration.

Science News Letter, April 6, 1940

IN SCIENCE

PSYCHOLOGY

New Test Measures Auditory Phantasy

HAVE you ever amused yourself by fitting words to some indistinct sound, such as a bird call, the cooing of a baby, or the rumble of traffic?

The phantasies in sound are similar to the pictures you can see in clouds of a summer day, swirl of smoke from a cigaret, a dancing fire, or an ink blot.

Such visual imaginings of both normal and mentally sick people have been used by physicians for some time. Now the corresponding pictures conjured up by sounds are being used to reach deeper into human minds.

A test of mishearing, auditory parallel of ink blot test for personality, has been adapted for the study of the mentally ill by Drs. David Shakow and Saul Rosenzweig of Worcester State Hospital, Massachusetts, who describe the test in *Character and Personality*. (March)

A phonograph record presents a human voice, repeating a series of meaningless vocal combinations. This is played out of sight of the patient or normal subject and at a little distance from him. The test is to guess what the voice is saying.

The mentally ill are continually troubled with hearing voices reviling them, calling them names, threatening them. This new tool enables physicians to elicit such hallucinations and to compare them with normal responses.

Science News Letter, April 6, 1940

CHEMISTRY

Plastic Clothes Pins Made in Pastel Shades

PLASTICS, synthetic resins, in the household: a new kind of clothes pin made in pastel shades designed to hold gently and firmly with a twist of the wrist engaging the three prongs in the line invented by Harry Rodemeyer of Detroit. Shelf lining paper with a synthetic resin finish — durable, washable, glass-like—backed by strong paper, serving the purpose of old-fashioned oil cloth, invented by Bert C. Miller of Montclair, N. J.

Science News Letter, April 6, 1940

NE FIELDS

AGRICULTURE

Borer Losses in Northeast Estimated at $4,000,000

A PRODUCTION tax of nearly 4% was levied last year on the corn crop of the northeastern states, by one insect pest, the European corn borer, U. S. Department of Agriculture estimates indicate. Value of the field and sweet corn corps in the corn borer's range last year was approximately $106,000,000; borer damage amounted to $4,000,000. This is nearly twice the estimated damage for the 1938 corn season.

The European corn borer's range is still confined mainly to the states east of the Mississippi and north of the Ohio. For some reason the insect has been slow in invading the great corn areas of the prairie states.

Science News Letter, April 6, 1940

MEDICINE

Cure Sought for Infantile Paralysis

TO FIND a chemical that cures infantile paralysis, to discover a "sulfanilamide" for this disease, is the objective of the latest research supported by the funds raised in honor of President Roosevelt's birthday.

A few months ago this new attempt would not have been possible. The discovery that a rat, the Eastern cotton rat, can be infected with the virus of this disease opens the road to a new attack. Dr. Charles Armstrong, of the U. S. Public Health Service, first showed last September that this animal can contract the disease from human victims.

With a docile and cheap experimental animal, a large variety of chemicals can be tried as a means of controlling the crippling ill. Just as Ehrlich tried chemical after chemical until 606 was discovered to conquer syphilis, just as scientists today have tried and developed sulfanilamide and its many compounds to cure deadly streptococcus infections and pneumonia, so there is hope that there can be found a chemical that will do the same for infantile paralysis.

At the Michigan State Health Department Laboratories, Lansing, Mich., America's first virus laboratory has been built. There Dr. S. D. Kramer, supported by National Foundation for Infantile Paralysis funds, will try chemical after chemical for infantile paralysis.

Hundreds and thousands of chemicals, if necessary, will be furnished by the Cyanamid Research Laboratories for this task. Scientists expect this research to take years. They cannot hope for spectacular speed. It may even fail in the long run. But they are confident that it is the right way to go about attacking the disease.

Science News Letter, April 6, 1940

ARCHAEOLOGY

Bones Tell of China's Ancient Weather and War

SPRING weather was war weather for ancient Chinese, as for warring nations today.

So it is learned from a study of oracles written on bones, unearthed at the capital of Shang Dynasty rulers in north China near Anyang. Inscribed on these bones, the oldest known writing in China dates from the latter part of this dynasty, which lasted from about 1766 to 1122 B. C.

Climate of northern China was slightly warmer then than now, concludes Dr. Karl August Wittfogel of the International Institute of Social Research at Columbia University. He has reported to the *Geographical Review* a study of 317 of the oracle bones which refer to weather and months of the year in connection with hunting, war and crops. It may be that the world was somewhat warmer in the fourth, third, and second millenia before Christ. Such studies as this will settle that argument.

In spring and autumn, ancient China's war lords consulted the oracle, hoping for dry weather for military exploits. Dr. Wittfogel suspects that another angle of springtime war was the fact that peasant armies could be mobilized better then, when millet fields required less attention.

Fighting weather was dry weather, and military leaders petitioned accordingly. But anxiety for rain for the crops is shown in other petitions of early months of the year. This may indicate that then, as now, peasants of north China desired more rain than they got.

The oracle questions were written on animal bones, and then the bone was heated. The line of cracking of the heated bone provided the oracle answer. And ancient China made war and planted its fields accordingly.

Science News Letter, April 6, 1940

MILITARY SCIENCE

Details of New 90-mm. Gun Not Disclosed by Army

DETAILS of the new 90-millimeter anti-aircraft gun just adopted as standard weapon for the U. S. Army are being kept under wraps for the present, but known facts about similar weapons used in the armed forces of other nations can give at least an approximate idea of what it is like.

The famous Swedish armament firm of Bofors has a weapon of slightly less caliber, 88 millimeters. This piece throws a 22-pound shell, as compared with the 15-pound shell of 75-millimeter guns. Carrying a larger explosive charge, it has a correspondingly larger danger zone around its bursting point. Its range is somewhat greater than that of the corresponding 75-millimeter weapon.

Rate of fire is somewhat less: a maximum of 20 rounds per minute, as compared with 28 rounds per minute for the lighter gun. Naturally, the larger weapon weighs more and therefore puts more of a load on roads and bridges when on the march.

Just before the present war broke out, the British army had adopted an anti-aircraft gun of 3.5-inch caliber. This is very close to the caliber of the new American weapon: 90 millimeters equals 3.54 inches. Performance data on the British gun have never been made public.

It is to be assumed that since the American gun is of later design than the foreign weapons of equivalent caliber, its performance will at least equal, and probably surpass, that of the others in its general class.

The 105-millimeter howitzer, whose adoption as a standard field piece was announced at the same time as that of the new anti-aircraft gun, has already been given public demonstration. Its 33-pound shell is more than twice the weight of the 75-millimeter projectile, and its range and accuracy of fire are at least as great as those of the famous "soixante-quinze." It is mounted on thick pneumatic tires, so that it can be towed over roads and through fields as fast as the fastest truck can move.

There has been a decided tendency in all armies lately to back up their field guns with howitzers that throw heavier shells on a more curved trajectory, in order to deliver a plunging fire on troops in entrenched positions which are difficult to reach with the flatter fire of the high-velocity field pieces.

Science News Letter, April 6, 1940

SEISMOLOGY-MILITARY SCIENCE

Quakes Betray Big Guns

Scientific Tool for Study of Earthquakes Adapted For Tracing Origin of Earth-Shaking Explosions

By DR. FRANK THONE

HAVE you ever watched the firing of a cannon, or the explosion of a heavy dynamite blast?

If your safe point of vantage was, say, about a quarter of a mile from the place of the explosion, you undoubtedly noticed that things didn't all happen at exactly the same instant. First you saw the flash and puff of smoke. Then, a full second later, came the jar and boom. Your ears were momentarily deafened, and you felt the earth jump beneath your feet.

That doesn't arouse wonder any more: we are all taught in school that light, with a velocity of 186,000 miles a second, can be counted as instantaneous for all earthly purposes, while sound, traveling through air at only about 1100 feet a second, takes measurable time to make itself heard at even fairly short distances.

However, the chances are that you were so absorbed in the exciting spectacle that you did overlook something. Did that twitch of the earth underfoot, that miniature earthquake, reach you exactly at the same time your ears heard the noise of the explosion? Most of us would say that it did. Actually, the jar gets there at least a split second before the boom. Waves in earth and solid rock, very much like the sound waves of the air, are started by explosions on or in the ground, and they travel somewhat faster than sound waves because of the greater density of the substances through which they move.

Scientists in uniform, serving behind both confronting lines in the West, are striving now to develop methods whereby they can make use of these earth-waves in locating opposing big guns when they are fired. During the World War, physicists succeeded in working out ways to find guns by getting sound records of their explosions for analysis. Now they are undertaking to do the same kind of thing with the little earthquakes set into vibration by the same discharges. The first method is known as sound ranging. The new method will be known as seismic ranging: in the language of science, "seism" means an earthquake.

(The word isn't one of the "jaw-breakers" of scientific jargon: just say "Size, Mick!" and you have it.)

This recruiting of seismic ranging to the aid of its older brother, sound ranging, is a natural development in artillery tactics, that have been turning more and more into a gigantic deadly game of blind man's buff.

In all wars up to 1914 you had to see your enemy's battery before you could shoot at it. Until the development of smokeless powder, about the turn of the century, that wasn't difficult: the great clouds of white smoke thrown out by the guns made concealment impossible.

Guns using smokeless powder are noticeable only for an instant, by the muzzle flash. Concealment therefore became possible, and camouflage was invented for them. So the game of blind man's buff started, with Death listening very carefully for any betraying sound; for no practical way of silencing heavy gunfire has ever been devised, or is likely to be. And now, Death's groping, sensitive fingers join his ears in the search, feeling the pulse of the trembling earth for the records of the great guns' recoil.

The instruments that will be used to search for guns by catching their earth-waves are modifications of delicate mechanisms that were invented originally for the peaceful and purely scientific study of earthquakes. They are known as seismographs. The name means "earthquake writers." That is an exact description of the instruments. When the earth vibrates, no matter how slightly and imperceptibly, under a seismograph, it swings a sensitively balanced pendulum, which in turn causes a pen to sway over a moving strip of paper, or a pencil of light to dance upon a photographically sensitive emulsion. The result is a wavy-line record, which the trained scientist can interpret in terms of distance, at least approximate direction, and exact time of origin of the disturbance, wherever it was.

Seismographs in university laboratories and government observatories can detect and locate major earthquakes thousands of miles away. So sensitive are they that they have to be mounted on solid pillars of rock or concrete, in vaults or caves deep underground, to shield them from extraneous vibrations. (One instrument, at Georgetown University's famous observatory, had to be relocated because whenever there was a strong wind the vibration of a tall, massively built stone tower overhead would spoil its records!)

Since the jobs that will be imposed on seismographs in military service will be expressed in terms of thousands of yards instead of thousands of miles, such sensitivity will not be required of field instruments. They can be made more rugged, simple, and portable—all of which will be a satisfaction to soldiers, who don't like delicate things that get out of order under usual campaign conditions.

Military seismographs will almost certainly be modifications of field instruments already in wide use by oil prospectors and other geologists, and by engineers who employ them in seeking bedrock on which to base dams, bridge piers and other heavy structures. These instruments are sensitive enough for all practical purposes, and so easily portable that two or three men can carry them anywhere.

These field seismographs of course have to get earthquakes made to order for them. This is done by exploding charges of dynamite or TNT at known distances from the instrument. The earth-waves not only come along near the surface of the ground to make their records; other waves plunge into the earth and are reflected from salt dome, ore body, bedrock or whatever it is the engineers or geologists are seeking. Time of travel down and back, and character and shape of recorded waves, tell how far down the reflecting body is, and something about its nature.

Especially successful use has been made of this method by the U. S. Army Engineer Corps in exploring sites for proposed new dams in the West. Cost of bedrock locating has been materially reduced through elimination of much of the time-consuming and expensive exploratory drilling formerly necessary. The taxpayer gets more dam per dollar than he used to, thanks to seismic exploration.

The military task of the seismic locator will differ in one important respect. Whereas the civil engineer knows ex-

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actly where his wave-causing explosion is, because he planted the charge himself, the military engineer will not know where his wave-source is located. That's exactly what the enemy will be trying to conceal.

The soldier-seismologist will operate on exactly the same principle as his scholarly colleague in the university observatory setup. You can't locate an earthquake from one seismological station. You take the records from three or more, at known distances apart. From each station you measure off the earthquake's distance (the records will show that) to scale on map, and strike an arc. When you have done that from several stations, you will find that the arcs intersect at one point, and at only one point. That is where the earthquake epicenter is located.

In the field, the seismic locators will be set up in groups, at carefully surveyed distances apart. When the great gun that they are seeking booms, each will get a record telling how far away it was, and (in a very general way) its direction from the instrument. The observers will transmit their data to a common calculating center, where distances will be laid out on a map, and arcs struck. Where the arcs intersect, there is your target.

At the same time, probably, similar searching will be going on from the sound-ranging stations, for a good artillery officer is never satisfied with information from one source alone but wants confirming information from as many different angles as he can get. If there is pretty good agreement between seismic and sound locations, maybe the planes will fly over for a look-see and a few photographs. And if the firing is going on at night or in dull weather, the flash-ranging stations will be straining eyes through telescopes at the suspected spot.

Finally, when all possible information has been garnered, you tell the bombers about it, or your own heavies elevate their muzzles for a little counter-battery shooting. Maybe you hit him and knock him out; maybe you only make him so uncomfortable that he stops shooting and gets away from a place suddenly grown too hot. But in either case you've got what you want: relief from a noisy, destructive annoyance.

Seismic ranging, like sound ranging, will probably be used mainly in hunting for the heaviest guns—the eight- and nine-inch field howitzers and the twelve- to fifteen-inch monster rifles of the railway artillery. Ordinary field pieces, of six-inch caliber on down, are too numerous; unless some particular gun or battery becomes too annoying the seismic locators will leave them for other soldiers to seek by other methods. The heavy pieces, fewer, more important, and very much more costly, will be the preferred prey.

One protective device will probably be

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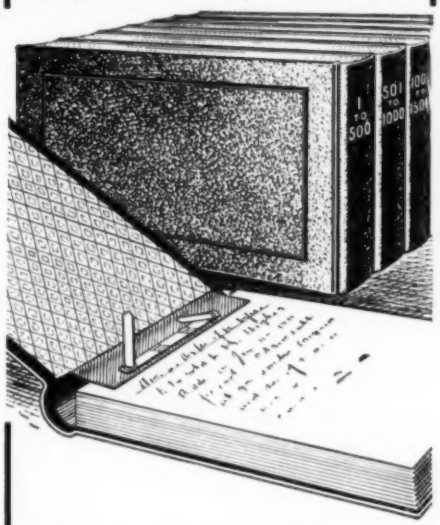

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used, whenever an especially important heavy gun is firing. Other medium and heavy pieces in the same neighborhood will become especially active at the same time, in an effort to mask the effect of the giant and confuse the records of the detectors on the other side.

This was done by the Germans, when they opened fire on Paris with their long-range guns (commonly but incorrectly called Big Berthas) in the spring of 1918. These super-guns were very deliberate in their firing—half-a-dozen shots a day was about their usual quota. Whenever they were ready to get off a shell, all the mediums and heavies in the whole St. Gobain sector worked overtime for a while, to try to throw the French sound-ranging service off the track.

It didn't work. Before the bombardment of Paris had been going on for as much as thirty hours, the French had gained at least an approximate idea of the site of the two guns that were then doing the firing, had moved up railroad guns, and were beginning to drop heavy shells so close to the Germans' emplacement that the latter were sure they had been betrayed by spies. But it was all done by the comparatively crude sound-ranging method then in use, plus a couple of suspicious-looking spots on a chance airplane photograph taken before the shooting started.

It will be at least as difficult to fool seismic locators, and probably more so. No two earthquakes ever make identical records, and neither will two guns, even of the same caliber, send exactly the same shaped waves through the earth. Every big shot will have its own signature, distinct and unforgeable, for the scientists in uniform in the opposite lines to read. And it probably will not take long for them to arrange for a return of courtesies.

Science News Letter, April 6, 1940

A new-born *bear cub* is smaller than a new-born kitten.

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INVENTION

U. S. Patent System Spurs Enterprise of the Nation

The Commissioner of Patents in Special Article Gives Background for Sesquicentennial Celebration

By CONWAY P. COE,
U. S. Commissioner of Patents

THE NATION is now celebrating the anniversary of an event that has grown steadily in importance down through the succeeding decades.

On April 10 in 1790 President George Washington approved the first United States patent law. With the enactment of that statute, which, by the way, he had urged as a help to inventors, our present patent system had its beginning.

That system, in turn, has spurred our advancement and not only has promoted our industrial welfare, but has also brought us social and political benefits great in number and significance. It has faithfully and fruitfully served the democracy that begot it.

There were inventors, of course, before 1790, and man's inventiveness long preceded our patent system. Down through the ages his ingenuity produced many useful contrivances. But for these there was no reward but their makers' sense of achievement. There was no material return, no protection; scarcely was there renown for the creators of these new mechanisms and methods.

Gunpowder has been for centuries both a beneficent and a baneful influence in the world, but the true identity of its discoverer is hotly disputed.

The American patent system has encouraged the use of good means to worthy ends. It has succeeded in profiting the whole nation by safeguarding and recompensing the individual. It has fulfilled the purpose which the authors of our Constitution had in view when they empowered Congress "To promote the progress of science and useful arts by securing * * * to inventors the exclusive rights to * * * their discoveries."

We owe to that incentive, I believe, the invention of the cotton gin only four years after the passage of the first patent law. As this stimulus became more widely known through the inventions it fostered and recognized, it prompted more and greater efforts and accomplishments.

Within a little more than fifty years after President Washington's approval of the law of 1790 came the telegraph, the reaper, the vulcanization of rubber, the revolver, the sewing machine and the rotary printing press.

In the 104 years since the revision and refinement of the patent system in 1836, there have been granted 2,196,000 patents to many thousands of individuals, the vast majority of them citizens of the United States. Only 9,957 patents were issued before July, 1836.

Many of the inventions covered by these 2,196,000 patents supply our needs and serve our convenience every hour of every day. Such marvels as the telephone, the incandescent electric lamp, the phonograph, motion pictures, the submarine, the linotype, the airplane and the radio, including television, are covered by patents granted in the last 65 years, that is, since the birth of six or seven millions of Americans still alive.

In the first century following the establishment of our patent system 405,262 patents were issued. More than four times that number, that is to say, 1,799,000, patents were issued. More than four times alone. And it will be conceded, I think, that the inventions patented in the last five decades are no less important than any that went before.

The use of these inventions presupposes their production, distribution and operation. To make and merchandise them requires the investment of capital and the employment of labor. Many of our greatest industries are founded on

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inventions. It is reasonable to believe that without these inventions we should not have the industries they created.

The word invention means to many people simply a machine that reduces or wholly displaces manpower and by that reduction and displacement raises economic problems and difficulties.

This subject is too big for complete discussion here, but I can give a generalization. We are not yet blessed—or cursed—with machines that make themselves. Those now in service had to be constructed of raw materials which had to be produced and transported and fashioned to requirements. All of these processes necessitated human effort.

In short, man is prior and indispensable to the machine. You can have man without a machine, but you can never have a machine without man.

The moral which this anniversary impresses on me is that patents have put a premium on genius, and all of us have shared the gains. Every successful invention becomes a new inspiration. While that impetus continues we may count on progressive improvement in our way of life.

Science News Letter, April 6, 1940

ANATOMY

Human Embryo in Third Week Added to World's Collection

Minute Creature Only Sixtieth of Inch in Diameter Is Complex in Structure; Football Affects Blood

A HUMAN embryo in the third week of its prenatal existence has been added to the world's small collection of invaluable specimens showing earliest stages in development of the human body. Microscopic sections of it were shown to the meeting of the American Association of Anatomists in Louisville, Ky., by Prof. John S. Latta of the University of Nebraska.

The almost pinpoint sized embyro (it is only about a sixtieth of an inch in diameter) was embedded in tissue which had to be removed from a patient in a Nebraska hospital. Serial sectioning disclosed its presence, and showed a considerable complexity in structure despite its minute size and brief period of development.

Science News Letter, April 6, 1940

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Football in the Blood

FOOTBALL "gets into the blood" of the players in a much more literal sense than the usual use of the phrase connotes, it was shown by studies of the blood of football men reported by Dr. Edmond J. Farris of the Wistar Institute of Anatomy and Biology, Philadelphia, to the American Association of Anatomists at Louisville, Ky.

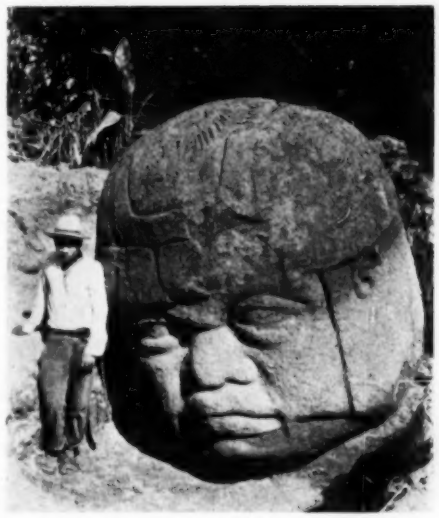
Dr. Farris took samples of blood from a number of football players before and after games throughout a hard playing season and made comparative counts of the red corpuscles and of several types of the white corpuscles. He found definite changes every time a game was played.

Until mid-season, football had a destructive effect on the red corpuscles; there was an average drop of 822,000 cells per cubic millimeter following each game. From mid-season on, however, the picture reversed itself, with an average increase of 618,000 red cells per cubic millimeter until the end of the season.

Both physical exertion and emotional stress showed their effects in changes of white blood cell numbers. Dr. Farris suggested that white corpuscle counts might possibly be used to give a quantitative measurement of fatigue and exhaustion effects.

Science News Letter, April 6, 1940

Maine's trout fishing season legally opens "when the ice goes out."



INDIAN MYSTERY

ARCHAEOLOGY

Mexico's Great Stone Heads Provide New Indian Mystery

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four of the mammoth carved heads are reported as having broad noses, thick lips, and prominent eyes. How Indians transported such heavy basalt boulders, six to eight feet high, to the swampy plain near La Venta, in the State of Tabasco, is not yet understood. Nearest basalt found by the archaeologists is 100 miles away. The age and the significance of the stone heads are other unsolved mysteries.

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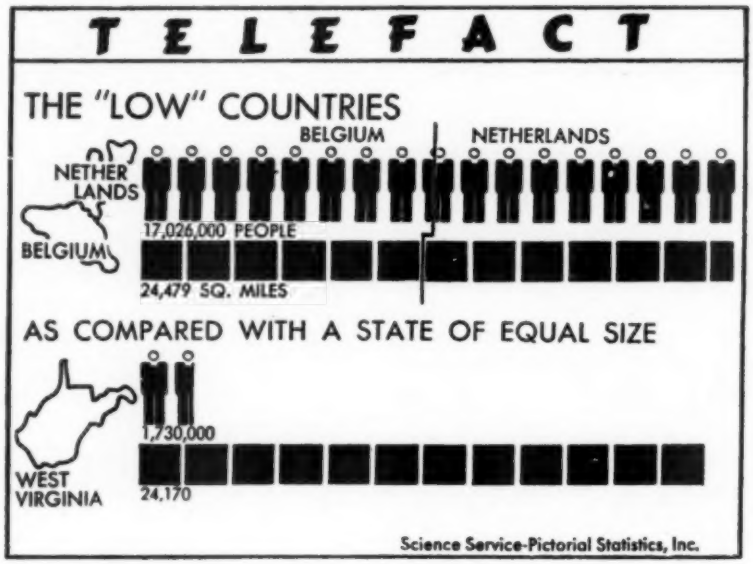
low is that the addition of secret acids to the activated carbon in his bombs has reduced their shock sensitivity which troubled earlier experimenters. Whether this reduction of shock sensitivity has, at the same time, reduced the power of the bomb, observers had no way of knowing, but Army experts can determine that if they wish to do so. It is almost axiomatic, however, that explosives which have the greatest detonation — or compression — waves as they explode are the most sensitive to shock. Pure nitroglycerine, for example, gives a terriffic compression wave but is so sensitive to shock that it is seldom used in a pure state as an explosive.

Inventor Barlow has been claiming amazing compression wave effects from his bombs. Although military experts have not tested his bombs carefully they are inclined to agree with him. But they add that the military usefulness of this shock wave may or may not be great. Such shock waves may be very effective on rigid objects like buildings, but not too potent on the human body which is more resilient.

Mr. Barlow's demand for his "goat test"—staking out goats at intervals in a great field and noting how many would be killed by the compression wave —would provide some test on this point. However, the experts will believe—until shown differently—that you cannot have terriffic compression wave effects and good safety, too. You can have one or the other, but not both.



A forthcoming test at the Aberdeen, Md. proving grounds of the Army, in which Barlow's explosive will be compared with TNT, should test this point.

If Mr. Barlow can get his terriffic shock wave and safety also, his bomb might be able to revolutionize trench warfare. Exploding the bomb some 30 feet in the air would drive a wave down into shell holes and trenches and kill the soldiers there unless they are deep down in dugouts.

The inventor, affiliated with the Glenn L. Martin Company, points out that with TNT airplane bombs half the weight of a 1,000-pound bomb is in its steel housing and that the plane with such a bomb is carrying only 500 pounds of explosive. He claims his bombs do not need this heavy container and that nearly all the 1,000 pounds payload could be in explosive.

Military experts, however, counter this point by saying that this heavy container gives the TNT bomb something with which to kill and claim that the Barlow bomb would need similar housing—that would splinter—to make it an effective lethal weapon. Again one sees the skepticism of the military mind to the lethal properties of the mere compression wave.

Finally comes the temporary character of the liquid oxygen-carbon bomb. Greatest claim of inventor Barlow is that a bomb 10 inches in diameter would have an explosive life of 30 hours. He quickly adds, however, that this is quite sufficient for any bombing flights that might be undertaken. Military experts admit this, but point to the need for an apparatus to liquefy oxygen at the bomber's home base. They strongly feel that such equipment would not be feasible for artillery batteries up near fighting lines whose location is often temporary, and hence see little value in the Barlow explosive for shells.

According to Mr. Barlow's figures, the liquid oxygen bomb would be much cheaper than TNT. He claims production of his explosive for four and a half cents a pound whereas TNT is now selling for about 25 cents a pound. In the last war TNT went up to $1.25 a pound.

An intriguing aspect for humanitarian laymen is that the Barlow bomb—because of its temporary nature—would be more defensive than an offensive weapon for America. This is because liquid oxygen plants might be constructed in our military airport bases, whereas an invading enemy, from across the seas, would be encumbered by portable installations.

However much this might apply to America, it would not apply in Europe where boundaries are close and a long bombing flight takes only 8 to 10 hours.

Science News Letter, April 6, 1940

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●RADIO

Dr. Harrison E. Howe, editor of *Industrial and Engineering Chemistry*, will discuss "ersatz" materials as guest scientist on "Adventures in Science" with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Thursday, April 11, 4:15 p.m., EST, 3:15 CST, 2:15 MST, 1:15 PST.

Listen in on your local station. Listen in each Thursday.

ASTRONOMY

Astronomers To Watch Tiny Planet Eros

ASTRONOMERS are being asked to keep an eye (or a telescope) on Eros, famous little planet about 15 miles in diameter. Dr. Fletcher Watson of Harvard College Observatory calls attention to the possibility of a short period variation of one magnitude in the brightness of this asteroid near the time of opposition—Eros, earth and sun being in that order—on June 16 next. This fluctuating of light is probably due to rotation of this close-approaching asteroid. From the changes in brightness astronomers hope to determine the size and shape. Best observation of Eros will be from southern hemisphere. Only four other asteroids come closer to earth than Eros: Amor, Apollo, Adonis and Hermes.

Science News Letter, April 6, 1940

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ZOOLOGY

NATURE RAMBLINGS *by Frank Thone*

Wasted Meat

MEAT, good meat, goes to waste by the ton in our woodlands, Prof. E. Laurence Palmer of Cornell University points out in a new publication, *Farm-Forest Facts*. Even though the meat yield of forest land is not large as compared with that of pasture and feed-lot, its yield of good quality flesh is high in the aggregate, and there is no good reason for letting it go unused.

A great deal of potential meat is left as a by-product of the fur industry. Prof. Palmer cites a sample year's production of probably more than 150 tons of raccoon flesh in New York State alone. At a low estimate of ten cents a pound, this runs into real money. He also quotes the estimate of a colleague, W. J. Hamilton, Jr., that 250 tons of muskrat flesh was wasted in the state during the same year. In some places muskrat is sold as "marsh rabbit"; it is easily as good to eat as rabbit, and commands a price of around 25 cents a pound.

Farmers who own game-yielding timber or brushland are often too easy-going about granting hunting privileges for nothing, it is declared. In some states, however, they have realized how good a source of supplementary cash hunting privileges can be. Some farmers in Texas, says Prof. Palmer, have been able to add as much as $2,000 a year to their incomes by proper arrangements with sportsmen desiring to shoot deer on their land.

Science News Letter, April 6, 1940

Seeking good but cheap *housing* materials to replace "slum" houses in rural districts, government scientists have experimented with steel, adobe, native stone, brick, and cotton.

DENTISTRY

Bad Hearing, Sinus Pain From Imperfect Bite

PEOPLE who have an imperfect bite, as dentists term it, may "chew themselves deaf," or into apparent sinus trouble, facial neuralgia and other conditions, Dr. Clyde H. Schuyler, New York City, declared at the Baltimore Dental Centenary.

"Impaired hearing, stuffy sensation in the ears, tinnitus, snapping noises while chewing, dull pain within and about the ears, dizziness at times of prostrating severity, alleged sinus symptoms, headaches and burning sensation in the throat, tongue and side of nose," Dr. Schuyler said, "have been relieved by establishing the proper relation of jaws and opposing teeth."

Such conditions, he pointed out, are not always due to imperfect bite, or malocclusion. They occur often enough, however, when upper and lower teeth do not close as nature intended so that dentists should always look for and correct the malocclusion.

Thumbsucking may upset the normal closing of the teeth and so may the loss of teeth which permits the elongation of teeth opposite the lost ones or the migration of those next to the missing tooth or teeth.

A snapping noise in the joint while eating is an early symptom of imperfect bite caused by premature contact of the back teeth in chewing or biting. A person with this condition will often dislocate his jaw while yawning. The condition, Dr. Schuyler said, can be overcome by spot-grinding.

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SPECTROSCOPE

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First Glances at New Books

HORTICULTURE

SOILLESS CULTURE, Simplified—Alex Laurie—*Whittlesey House,* 201 p., $2.50. This newest addition to the fast-growing literature on growing plants without soil pays particular attention to the plant-physiological background, in addition to giving adequate treatment to the practical technique of soilless culture itself. This will make the book particularly valuable for instructional purposes.

Science News Letter, April 6, 1940

PSYCHOLOGY

THE ART OF UNDERSTANDING—Harry J. Baker—*Christopher Pub. House,* 400 p., $3. A book of psychological advice for the layman who wants to understand others, particularly children. It developed from the problems presented to the author as clinical psychologist in the Detroit public schools.

Science News Letter, April 6, 1940

EDUCATION

TRAINING FOR THE JOB, Vocational Education for Adults — Frank Ernest Hill—*Amer. Assoc. for Adult Education,* 160 p., $1.25. A discussion for fitting men and women to the jobs of modern America. Men and women, whether 16 or 60, who are "through with school" need training in order to equip them for the work, old or new, that they are going to do. This book discusses how it is done and how it should be done.

Science News Letter, April 6, 1940

ASTRONOMY

THE EARTH AS A CLOCK, being the Halley Lecture delivered on June 5, 1939 —H. Spencer Jones—*Oxford Univ. Press,* 32 p., 75c. See SNL, March 30, p. 201.

Science News Letter, April 6, 1940

ENGINEERING

THE HEATING, VENTILATION AND LIGHTING OF SCHOOL BUILDINGS — W. Douglas Seymour—*Oxford Univ. Press,* 211 p., $4.25. A British survey of working conditions in schools which has been carried on since 1934 with the support of the Pilgrim Trust. Physiological and psychological considerations are studied as well as the usual architectural and engineering aspects.

Science News Letter, April 6, 1940

ASTRONOMY

THREE COPERNICAN TREATISES: The *Commentariolus* of Copernicus, The *Letter Against Werner,* The *Narratio Prima* of Rheticus—Edward Rosen, trans. and ed.—*Columbia Univ.,* 211 p., $3. Historians of astronomy and mathematics and all others interested in tracing the development of scientific ideas will find this book of great value. It makes available, for the first time in English, the three treatises which formed the only written warning the sixteenth century had, of the coming work of Copernicus which was to upset a self-centered theological world by propounding a heliocentric theory of the universe.

Science News Letter, April 6, 1940

BIOLOGY

PRAIRIE NEIGHBORS—Edith M. Patch and Carroll Lane Fenton—*Macmillan,* 161 p., $1.75. No Patch-Fenton book needs a blurb or a boost, with those who know them. This, like all previous products of that happy collaboration, tells its stories of birds, beasts and insects simply, clearly, accurately, with illustrations in full keeping with the text. Children, for whom the book is primarily written, will delight in it—when they can capture it from fascinated elders.

Science News Letter, April 6, 1940

ANTHROPOLOGY

SOUTHERN PAIUTE SHAMANISM—Isabel T. Kelly—*Univ. of Calif. Press,* 16 p., 25c. (Anthropological Records, Vol. 2, No. 4)

Science News Letter, April 6, 1940

CHEMISTRY

PYROTECHNY—George W. Weingart—*Chemical Pub. Co.,* 182 p., $5. This most useful book is a practical manual for manufacturers of fireworks, signals, flares and pyrotechnic displays.

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ANTHROPOLOGY—JUVENILE

RHAMON, A Boy of Kashmir—Heluiz Washburne—*Albert Whitman,* 127 p., $2. In large print and with colored pictures, this is the tale of a little lame boy who brought flowers for a Rajah and won the great man's interest. The author knows India, and is a first-rate story teller.

Science News Letter, April 6, 1940

GEOGRAPHY

ECUADOR, THE UNKNOWN — Victor Wolfgang von Hagen — *Oxford Univ. Press,* 296 p., $3.50. Travel through picturesque mountain and jungle country, with many strange features of Indian life described. The author also spent some months in the Galapagos islands and urges that the remarkable fauna be preserved in an animal sanctuary.

Science News Letter, April 6, 1940

AERONAUTICS

UP AND AT 'EM—Harold E. Hartney —*Stackpole,* 333 p., $2.50. The story of the role of America's famous First Pursuit Group in the World War, including anecdotes of such outstanding aces as Capt. Edward V. Rickenbacker, Major Raoul Lufbery and Lieut. Frank Luke told by their commanding officer. Those in the field of aviation or military tactics will be particularly interested in Col. Hartney's analysis of the difficulties and advantages of military flying as it was in those days and as he predicts it will be in America's next war.

Science News Letter, April 6, 1940

POLITICAL SCIENCE

EUROPE UNDER X-RAY — William F. Sigmund—*Blue Ribbon Books,* 24 p., $1. Fascinating portrayal of Europe's problems by a series of maps showing battle lines, sources of army supplies, and shifting frontiers. The X-ray feature consists of transparent red sheets superimposed over maps to show changing conditions.

Science News Letter, April 6, 1940

ANTHROPOLOGY

THE 1870 GHOST DANCE — Cora Du Bois—*Univ. of Calif. Press.,* 151 p., $1.50. (Anthropological Records, Vol. 3, No. 1)

Science News Letter, April 6, 1940

ZOOLOGY

A NEW CORNUCOPINA (BRYOZOA) FROM THE WEST INDIES—Raymond C. Osburn —*Smithsonian Inst.,* 3 p., 2 pl., 10c.

Science News Letter, April 6, 1940

BOTANY

STUDIES OF AMERICAN PLANTS—IX— Paul C. Standley — *Field Museum of Natural History,* 62 pl., 50c.

Science News Letter, April 6, 1940

ANTHROPOLOGY

PREHISTORY IN HAITI, A Study in Method — Irving Rouse — *Yale Univ. Press,* 202 p., 5 pl., $2.50. (Yale Univ. Pub. in Anthropology, No. 21). This book describes a new experimental technique in archaeological method, for use in reconstructing cultural history.

Science News Letter, April 6, 1940

MEDICINE

HANDBOOK ON TUBERCULOSIS FOR PUBLIC HEALTH NURSES—Violet H. Hodgson—*National Tuberculosis Assn.,* 92 p., 50c. Authoritative and useful information for public health nurses, whether or not specializing in tuberculosis nursing.

Science News Letter, April 6, 1940